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EXAMINER	
ANGELL, JON E	
ART UNIT	**PAPER NUMBER**
1635	

DATE MAILED: 02/13/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/834,760	AUSTIN ET AL.	
	Examiner	Art Unit	
	Jon Eric Angell	1635	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *17 November 2005*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *47-54,56-59,62 and 67* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *47-54,56-59,62 and 67* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *12 April 2001* is/are: a)☐ accepted or b)☒ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 11/17/2005 has been entered.

Claims 47-54, 56-59, 62 and 67 are currently pending and are examined herein.

Applicant's arguments are addressed on a per section basis. The text of those sections of Title 35, U.S. Code not included in this Action can be found in a prior Office Action. Any rejections not reiterated in this action have been withdrawn as being obviated by the amendment of the claims and/or applicant's arguments.

Drawings

The drawings submitted 4/12/2001 remains objected to, for the reasons of record. It is acknowledged that Applicants have indicated that formal drawings will be submitted upon receiving a Notice of Allowance.

Claim Rejections - 35 USC § 112, 2nd paragraph

The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claim 62 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 62 is encompasses a method comprising administering "CSF-1" to a cell within a mammal. However, the specification does not appear to disclose "CSF-1" anywhere in the specification. Without a clear definition of the term "CSF-1" in the specification, one of skill in the art would not know the metes and bounds of the claim because he would not know what a "CSF-1" is and what "CSF-1" is not without a clear definition.

Claim Rejections - 35 USC § 112, 1st paragraph (New Matter)

The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

Claims 47-54, 56-59 and 62 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. **This is a new matter rejection.**

37 CFR 1.118 (a) states that "No amendment shall introduce new matter into the disclosure of an application after the filing date of the application".

MPEP §2163.06 notes:

If new matter is added to the claims, the examiner should reject the claims under 35 U.S.C. 112, first paragraph - written description requirement. In re Rasmussen, 650 F.2d 1212, 211 USPQ 323 (CCPA 1981).

MPEP §2163.02 teaches that:

Whenever the issue arises, the fundamental factual inquiry is whether a claim defines an invention that is clearly conveyed to those skilled in the art at the time the application was filed...If a claim is amended to include subject matter, limitations, or terminology not present in the application as filed, involving a departure from, addition to, or deletion from the disclosure of the application as filed, the examiner should conclude that the claimed subject matter is not described in that application.

MPEP §2163.06 further notes:

When an amendment is filed in reply to an objection or rejection based on 35 U.S.C. 112, first paragraph, a study of the entire application is often necessary to determine whether or not "new matter" is involved. Applicant should therefore specifically point out the support for any amendments made to the disclosure.

In the instant case claim 47 is drawn to a method comprising administering a polynucleotide encoding an ER resident calcium binding protein to a subject wherein the ER resident calcium binding protein is, among others, cis/trans prolyl isomerase or HSP47. It is noted that the claim has been amended during prosecution to be drawn to these specific embodiments (e.g., see the amendments filed 11/17/2005 and 7/2/2004). However, a thorough search of the specification was performed and support for the assertion that cis/trans prolyl isomerase and HSP47 are ER resident calcium binding proteins cannot be found. Furthermore, the there a search of the relevant art did not identify any articles which acknowledge cis/trans prolyl isomerase or HSP47 as calcium binding proteins.

Claim 62 has been amended to include the limitation "CSF-1". It is noted that the claim has been amended during prosecution to be drawn to this specific embodiment (e.g., see the amendment filed 11/17/2005). However, a thorough search of the specification was performed and support for the limitation "CSF-1" cannot be found.

Since explicitly, implicitly or inherently support for the indicated limitations could not be found in the original disclosure these limitations amount to new matter and the instant rejection is appropriate.

Should Applicants disagree, they are asked to identify by specific page and line number where in the disclosure support for the indicated limitations can be found.

To the extent that the claimed compositions and/or methods are not described in the instant disclosure, the claims are also rejected under 35 U.S.C. 112, first paragraph, as containing subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention, since a disclosure cannot teach one to make or use something that has not been described.

Claim Rejections - 35 USC § 112, 1st paragraph, (Scope of Enablement)

The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

Claims 47-54, 56-59, 62 and 67 are rejected under 35 U.S.C. 112, first paragraph, because the specification, while being enabling for:

> A method for inhibiting the generation of active thrombin on the surface of a cell within a mammal wherein said method comprises directly administering to said cell a polynucleotide which encodes and expresses an ER resident calcium binding protein wherein said ER resident calcium binding protein is selected from the group consisting of GRP78/BiP, GRP94, GRP72, calreticulin, calnexin, reticulocalbin, protein disulfide isomerase, whereby said ER resident calcium binding protein is produced in said cell and the generation of active thrombin on the surface of said cell is inhibited;

AND

> A method for inhibiting the generation of active thrombin on the surface of a cell within an atherosclerotic plaque within a mammal wherein said method comprises administering directly to said cell interleukin-3, whereby the generation of active thrombin on the surface of said cell is inhibited;

does not reasonably provide enablement for the full scope encompassed by the claims. Specifically, the claims are not enabled for any route of administration other than direct delivery to the target cell. The specification does not enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to practice the method commensurate in scope with these claims.

Factors to be considered in determining whether a disclosure meets the enablement requirement of 35 USC 112, first paragraph, have been described by the court in *In re Wands*, 8 USPQ2d 1400 (CA FC 1988).

Wands states on page 1404,
"Factors to be considered in determining whether a disclosure would require undue experimentation have been summarized by the board in Ex parte Forman. They include (1) the quantity of experimentation necessary, (2) the amount of direction or guidance presented, (3) the presence or absence of working examples, (4) the nature of the invention, (5) the state of the prior art, (6) the relative skill of those in the art, (7) the predictability or unpredictability of the art, and (8) the breadth of the claims."

The nature of the invention

The instant claims are drawn to methods for inhibiting the generation of active thrombin on the surface of cells in a mammal by increasing the expression of an ER resident chaperone protein in the cells (including cells in an atherosclerotic plaque), and encompass administering a compound or a nucleic acid encoding an ER resident chaperone protein to said cell. Therefore the nature of the invention is atherosclerosis therapy and the claims explicitly encompass gene therapy.

The breadth of the claims

Claims 47-54 and 56-59 encompass introducing a polynucleotide encoding one of the following "ER resident calcium binding proteins" into a cell in an atherosclerotic plaque: GRP78/BiP, GRP94, GRP72, Calreticulin, Calnexin, Reticulocalbin, Protein disulfide isomerase, cis/trans-Prolyl isomerase, and HSP47. Claims 62 and 67 encompass administering IL-3 or CSF-1 to a cell in a mammal. It is noted that the claims do not set forth any particular route of administration for the ER resident calcium binding protein (claims 47-54 and 56-59) or for the IL-3/CSF-1 (claims 62 and 67). It is noted that the specification specifically disclose "any standard procedure for introducing foreign nucleotide sequences into host cells may be used" (see page 17, lines 24-25), and "compounds can be administered by a variety of methods including, but not limited to, parenteral, topical, oral, or local administration, such as by aerosol or transdermally" (see page 35, lines 20-23). Therefore, given the broadest reasonable interpretation consistent with the specification, the claims encompass administering the polynucleotides, IL-3 and CSF-1 by any route of administration including systemic administration.

The unpredictability of the art and the state of the prior art

Regarding the administration of a nucleic acid encoding a gene of interest to a cell in a mammal (i.e. gene therapy), it is well established in the art that delivery is one of the key problems. For instance, regarding gene therapy in general, Anderson (Nature 1998; 392(suppl):25-30) teaches,

> The challenge is to develop gene therapy as an efficient and safe drug delivery system. The goal is more difficult to achieve than many investigators had predicted... The human body has spent many thousands of years learning to protect itself from the onslaught of environmental hazards, including the incorporation of foreign DNA into its genome. (See p. 25, second paragraph). The ultimate goal of gene therapy research is the development of vectors that can be injected, will target specific cells, will result in safe and efficient gene transfer into a high percentage of those cells, will insert themselves into appropriate regions of the genome (or will persist as stable episomes), will be regulated be either by administered agents or by the body's own physiological signals, will be cost effective and will cure disease. (See p. 30, first paragraph).

Crystal (Science 1995; 270:404-410) also indicates some of the problems associated with gene therapy in general, including problems associated with delivery. Specifically, regarding the obstacles of human gene transfer, Crystal teaches, "The [gene transfer] vector (should) be specific for its target, not recognized by the immune system..." (See p. 409, column 2 under "The perfect vector").

Regarding the delivery of gene therapy vectors to tumors, but applicable to the specific delivery of all gene therapy molecules, Greco (Frontiers in Biosci. 2002; 7:d1516-1524) teaches,

> The administration of gene therapy vectors requires that they be not only targeted, but also protected from degradation, sequestration or immune attack, in order to reach the appropriate sites for transfection. Although some success has been reported for naked DNA, efficient delivery has been restricted to intratumoral injection. (See p. 1517, paragraph bridging columns 1-2).

Therefore, Greco indicates that direct delivery of the nucleic acid to the desired site of transfection is critical for delivering the nucleic acid to the appropriate target cells.

It is noted that although the above references speak directly to administering polynucleotides to a subject, the teachings are also relevant to the administration of polypeptides (e.g., IL-3 and CSF-1) because the polypeptide would also have to be protected from degradation, sequestration or immune attack, in order to reach the appropriate sites (i.e., cells) of activity.

Furthermore, with respect to claims 47-54 and 56-59 as they read on administering a polynucleotide encoding the ER resident calcium binding proteins cis/trans-prolyl isomerase and HSP47, it is noted that a thorough search of the prior and post filing art was performed and no articles were found which teaching that cis/trans-prolyl isomerase and HSP47 are calcium binding proteins. For instance, Sauk et al. (Frontiers in Bioscience, Vol. 10, 2005; pages 107-118) teaches that HSP47 is an ER resident protein with collagen binding properties (e.g., see page 107, first column). Also, Shou et al. (Nature, Vol. 391, 1998; pages 489-492) teaches that FKBP12 (cis/trans prolyl isomerase) interacts with a number of different molecules including FK506, rapamycin, and multiple intracellular calcium release channels including RyR1 (e.g., see abstract). However, neither Sauk nor Shou teach that HSP47 and cis/trans prolyl isomerase are calcium-binding proteins, as required by claim 47. Furthermore, there is no indication in the instant disclosure that HSP47 and cis/trans prolyl isomerase are calcium-binding proteins. Therefore, there is no indication in the relevant art of record or in the specification which indicates that HSP47 and cis/trans prolyl isomerase are calcium-binding proteins. In fact, based on the teachings of the art of record, it appears that HSP47 and cis/trans prolyl isomerase do not bind calcium. Therefore, additional experimentation would be required in order to investigate the activity of HSP47 and cis/trans prolyl isomerase in cells.

It is noted that the specification and/or relevant art appear to recognize GRP78/BiP, GRP94, GRP72, Calreticulin, Calnexin, Reticulocalbin, Protein disulfide isomerase as ER resident calcium binding proteins (e.g., see page 8, lines 7-11; Morris et al. JBC 1997, previously of record).

Working Examples and Guidance in the Specification

The specification discloses that expression of recombinant GRP78/BiP (an ER resident chaperone protein) inhibits the generation of active thrombin on the surface of cells (in vitro). There is no disclosure indicating that any ER resident chaperone protein other than GRP78/BiP is capable of inhibiting the generation of active thrombin on the surface of a cell. Considering that ER resident chaperone proteins have different functions (such as Calcium regulation, protein folding, and protein transport) it is unpredictable which ER resident chaperone proteins could inhibit the generation of active thrombin on the surface of a cell.

There is no disclosure in the specification which overcomes the problems regarding non-direct delivery recognized in the art. Therefore, it is unpredictable that the compounds of interest could be administered by any means other than direct administration to the target cells and result in the desired effect on the specifically desired cells.

The specification and the prior art (Brewer) teach that IL-3 can activate the expression of GRP78/BiP.

There is no disclosure in the instant specification that indicates that either HSP47 or cis/trans prolyl isomerase are ER resident calcium binding proteins.

Quantity of Experimentation

Considering the breadth of the claims, the unpredictable nature of the invention, and the limited guidance provided in the specification, additional experimentation would be required in order to practice the methods to the full scope encompassed by the claims. For instance, additional experimentation would be required to overcome the problems associated with systemic delivery of compounds to the specific target cell(s). Furthermore, additional experimentation would be required in order to study the activity of HSP47 and cis/trans prolyl isomerase in cells.

Level of the skill in the art

The level of the skill in the art is deemed to be high.

Conclusion

Considering the breadth of the claims, the unpredictable nature of the invention, the limited guidance provided in the specification and the high degree of skill required to practice the claimed methods, additional experimentation would be required in order to use the invention to the full scope encompassed by the claims. Based on the evaluation of all of the Wands factors as a whole, it is concluded that the amount of experimentation required to perform the broadly claimed invention to its full scope is undue.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 62 and 67 are rejected under 35 U.S.C. 102(b) as being anticipated by Vannucchi et al. (Haematologica, Vol. 80, 1995; pages 341-343).

The instant claims are drawn to a method of inhibiting the generation of active thrombin on the surface of a cell within a mammal, the method comprising increasing the expression or activity of an ER resident calcium-binding protein in said cell by administering a proinflammatory cytokine to said cell, wherein said pro-inflammatory cytokine is interleukin-3 (IL-3). It is noted that the recitation "of inhibiting the generation of active thrombin on the surface of a cell within a mammal" does not have patentable weight because the recitation occurs in the preamble. A preamble is generally not accorded any patentable weight where it merely recites the purpose of a process or the intended use of a structure, and where the body of the claim does not depend on the preamble for completeness but, instead, the process steps or structural limitations are able to stand alone. See *In re Kropa v. Robie*, 187 F.2d 150, 152, 88 USPQ 478, 481 (CCPA 1951). Furthermore, the recitation "increasing the expression or activity of an ER resident calcium-binding protein in said cell" is considered functional language such that the mere performance of the claimed method steps would necessarily result in the increased expression or activity of an ER resident calcium-binding protein in the cell. As such, the only limitation given patentable weight in the instant method is administering the pro-inflammatory cytokine IL-3 to a cell in a mammal. Therefore, any teaching of administering the pro-inflammatory cytokine IL-3 to a cell in a mammal in the prior art would anticipate the instant claims.

Vannucchi et al. teaches administering the pro-inflammatory cytokine IL-3 to a cell in a mammal. Specifically, Vannucchi et al. teaches administering recombinant human IL-3 to a 24-

year-old man by continuous i.v. infusion. Although Vannucchi does not explicitly teach that the administration of the IL-3 resulted in the increased expression or activity of an ER resident calcium binding protein in a cell in the man, the fact that the IL-3 was administered to cells in the mammal would necessarily result in the increased expression or activity of an ER resident calcium binding protein in the cells contacted by the IL-3.

Response to Arguments

Applicant's arguments filed 11/17/2005 have been fully considered.

In response to Applicants arguments regarding the rejection of claims under 35 USC 112, 1st paragraph (scope of enablement) (see pages 6-8 of the communication filed 11/17/2005), it is acknowledged that the instant claim 47 has been amended to narrow the claim to administering a polynucleotide that encodes one of the following "ER resident calcium binding proteins": GRP78/BiP, GRP94, GRP72, Calreticulin, Calnexin, Reticulocalbin, Protein disulfide isomerase, cis/trans-Prolyl isomerase, and HSP47. It is also acknowledged that claim 62 has been narrowed to administering IL-3 (or CSF-1) to a cell in a mammal. As such, the amendment has addressed the issue of encompassing any ER resident calcium binding protein and any pro-inflammatory cytokine. However, upon further consideration, it appears that cis/trans-Prolyl isomerase and HSP47 are not ER resident calcium binding proteins, for the reasons indicated above. Since cis/trans-Prolyl isomerase and HSP47 are recognized as binding to molecules other than calcium, further experimentation would be required in order to be able to practice the instant claimed method to its full scope.

With respect to the Dai et al. reference, applicant's arguments are persuasive in view of the amendment to the claims. Therefore, Dai et al. is not a basis for the instant rejection.

However, the amendment has not narrowed the claims to direct administration to the target cells. As such, the instant claims are still broad with respect to the route of administration, as previously indicated and reiterated above. Therefore, the claims still encompass administering the compounds (i.e., the polynucleotides and the IL-3 polypeptide) by any route of administration such as general oral administration or general systemic delivery. Considering the art of record indicates that there are a number of different problems recognized for non-direct delivery including: targeting the therapeutic to the desired cell(s), protection from degradation, sequestration or immune attack, etc. (e.g. See Anderson, Greco, etc. as indicated above).

Applicants argue that the specification teaches a number of different delivery methods for delivering the molecules to the target cells. Specifically, Applicants argue that the specification teaches that non-viral vectors such as naked DNA can be introduced into target cells using various transfection-facilitating reagents including liposome-mediated transfection-facilitating reagents which were known in the art and used by those of skill in the art as of the filing date to deliver nucleic acid to target cells of interest. Moreover, Applicants respectfully submit that, as of the filing date, it was well within the level of skill in the art to be able to adjust the dosing regime so that the vector of interest expresses the therapeutic compound at a high enough level and for a sufficient amount of time to have a therapeutic effect. As such, Applicants assert that the teachings of the instant specification, coupled with the general knowledge in the art at the time of the present invention, provide modes of delivery that allow for administration of nucleic acids to target cells.

In response, it is acknowledged that there were a number of different liposome-mediated transfection-facilitating reagents which were known in the art. However, there is no evidence of record which indicates that the liposome-mediated transfection-facilitating reagents could be used to specifically delivery a nucleic acid to a specific target cell in vivo when the liposome/nucleic acid complex is administered by any route of administration other than by directly administering the liposome/nucleic acid complex to the target cells. One of skill in the art would not expect any route of administration (e.g., oral/ systemic administration) other than direct administration to result in specific delivery of the polynucleotide to the target cells in an atherosclerotic plaque. Therefore Applicants arguments with respect to the route of administration are not persuasive and the claims are not enabled to their full scope for the reasons indicated herein.

With respect to the rejection of claims under 35 USC 112, 1st paragraph (Written Description) and 35 USC 102(b) the amendment has rendered the rejections moot. However, upon further consideration, a new ground(s) of rejection is made under 35 USC 112, 1st paragraph (New Matter) and 35 USC 102(b) for the reasons indicated herein.

Conclusion

No claim is allowed.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jon Eric Angell whose telephone number is 571-272-0756. The examiner can normally be reached on Mon-Fri, with every other Friday off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Andrew Wang can be reached on 571-272-0811. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

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